

1/3

D4

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 03-154771A

(43)Date of publication of application : 02.07.1991

(51)Int Cl.

B24B 37/00

B24B 37/04

B24B 57/02

H01L 21/304

(21)Application number : 01-293561

(71)Applicant : NEC CORP

(22)Date of filing : 10.11.1989

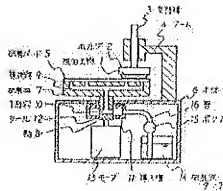
(72)Inventor : WADA SHIGENOBU

## (54) POLISHING DEVICE

## (57)Abstract:

**PURPOSE:** To feed a uniform abrasive liquid to the body to be worked by providing a polishing pad in the structure of having a liquid flowing property in the vertical direction and a polishing tray having the liquid leading passage communicating to the upper face from the internal part on a polishing face.

**CONSTITUTION:** An abrasive liquid is fed from the lower part to the work face of the body 1 to be worked via a pipe 16, leading ring 11, T shaped hole 10, liquid leading pass P and the polishing pad 5 by operating a pump 15, in the state of rotating a polishing tray 7 and the polishing pad 5 by rotating a motor 13. Accordingly, the abrasive liquid is uniformly fed to the surface of the body 1 to be worked and so a good work face can be obtained without the polishing face being blurred and the surface roughness becoming larger.



### Detailed Description of the Invention:

Figure 1 is a cross sectional view illustrating an embodiment of a polishing apparatus according to the present invention. As illustrated in the figure, the polishing apparatus includes: a circular plate-like holder 2 which holds, on a lower surface thereof, a thin plate-like material to be processed 1 by means of an adhesive or the like; a round bar-like support bar 3 which is connected to the center of an upper surface of the holder 2, is inserted into and held by a hole of an arm 4, and can move and rotate so as to follow a surface of a rotating circular plate-like polishing pad 5; a main body 6 which fixes another end of the arm 4; the polishing pad 5 which is bonded to an upper surface of a circular plate-like polishing dish 7; a shaft 8 which is formed integrally with the polishing dish 7; a liquid guide path 9 which is formed inside of the polishing dish 7, and communicates from the shaft 8 to a plurality of holes formed on the upper surface of the polishing dish 7; an introduction ring 11 which communicates with the liquid guide path 9 and a T-shaped hole 10 of the shaft 8, is provided in an outer peripheral part of the shaft 8 so as to rotatably hold the shaft, and supplies a polishing liquid from the outside to the T-shaped hole 10 of the rotating shaft 8; a seal 12 which is provided in a gap around the outer peripheral part of the shaft 8 in order to prevent liquid leakage; a motor 13 whose rotation shaft is connected to an end of the shaft 8, and rotates the polishing dish 7 and the polishing pad 5 via the shaft 8; and a polishing liquid tank 14 which supplies the polishing liquid to the introduction ring 11 through a pump 15 and a pipe 16 to supply the polishing liquid to a rear surface of the polishing pad 5 through the T-shaped hole 10 and the liquid guide path 9.

Figure 2 is an enlarged view illustrating the vicinity of the material to be processed in the embodiment of the polishing apparatus according to the present invention. In addition, as illustrated in the figure, the polishing pad of the polishing apparatus is formed by heating and sintering resin fine particles, and has a structure with gaps therein, which enables the polishing liquid to pass through from the rear surface to the front surface of the pad. Next, description is given of the case where the polishing apparatus according to the present embodiment is used to polish the material to be processed. First, the motor 13 is rotated, to thereby rotate the polishing dish 7 and the polishing pad 5. In this state, the pump 15 is operated, to thereby supply the polishing liquid from below to a processed surface of the material to be processed via the pipe 16, the introduction ring 11, the T-shaped hole 10, the liquid guide path 9, and the polishing pad 5. This enables the polishing liquid to be supplied uniformly to the surface of the material to be processed. Therefore, tarnish of a polished surface and an increase in surface roughness are avoided, and therefore an excellent processed surface can be obtained.

Here, polishing was performed by using the polishing apparatus having the above-mentioned structure, for example, a silicon single crystal wafer having a diameter of 150 mm as the material to be processed, a sintered polyethylene sheet (average particle diameter: 100  $\mu\text{m}$ ) as the polishing pad, and a commercially available colloidal silica 10% solution (Nissan Chemical Industries, Ltd., product name: SNOWTEX30) as the polishing liquid. As a result, a mirror surface having a surface roughness of 5 nm or smaller from the vicinity of an end of the wafer to the center

3/3

thereof could be obtained. Under the same conditions, when a conventional method is applied only to a polishing liquid supply method, a similar mirror surface can be obtained in the vicinity of the end of the wafer, whereas tarnish occurs at the central part thereof due to lack of the supplied polishing liquid, and the surface roughness is deteriorated to 20 nm or larger.

In the present embodiment, description has been given of the case of using a sintered resin structure as the structure of the polishing pad, but in order to realize the present embodiment, a liquid is required to pass through the polishing pad in a cross sectional direction thereof. Therefore, the similar effect can be obtained even in the case of using a polishing pad of normal foamed polyurethane or a polishing pad of polyester nonwoven fabric in which micropores or grooves are formed. In addition, description has been given of the case of using, as the structure of the liquid guide path, the structure in which the polishing liquid is supplied through the holes formed in the surface in contact with the polishing pad, but the similar effect can be obtained even in the case where the polishing liquid is supplied through grooves or holes of a porous material.